Prevalence of Hepatitis C Among Injection Drug Users in England and Wales: Is Harm Reduction Working?

Vivian D. Hope, PhD, MMedSc, Ali Judd, MSc, Matthew Hickman, MPH, MFPHM(Hon), Theresa Lamagni, MSc, Gillian Hunter, MSc, Gerry V. Stimson, PhD, MFPHM(Hon), Steve Jones, BA, Linda Donovan, BSc, John V. Parry, PhD, and O. Noël Gill, MB, FFPHM

ABSTRACT

Objectives. This study sought to establish the prevalence of hepatitis C antibodies (anti-HCV) and hepatitis B antibodies (anti-HBc) among injection drug users in England and Wales.

Methods. A voluntary cross-sectional survey collected oral fluid samples and behavioral information; 2203 injectors were recruited through drug agencies, and 758 were recruited in the community.

Results. Prevalence was 30% for anti-HCV, 21% for anti-HBc, and 0.9% for HIV antibodies. Anti-HCV prevalence rates were significantly greater among those with longer injecting careers, those in older age groups, those residing in London, those recruited in drug agencies, those positive for anti-HBc, and those with a previous voluntary HIV test.

Conclusions. Anti-HCV prevalence rates among injectors in England and Wales, where comprehensive harm reduction programs exist, are lower than rates in other industrialized countries. (*Am J Public Health.* 2001;91:38–42)

In the industrialized world, most transmission of hepatitis C virus (HCV) occurs through injection drug use, with prevalence typically above 60% among injection drug users.[1–5] In England and Wales, local studies of injectors receiving drug treatment in the mid-1990s revealed HCV prevalence of 59% to 67%.[6–8] Estimates of HCV incidence among injection drug users in other industrialized countries are also high, typically ranging from 10% to 20% per annum.[1] For many, infection may be acquired rapidly after initiation of injecting[9]; high prevalence has been found among those with short injecting careers (e.g., in Baltimore, 65% of those injecting for 1 year or less).[10]

There is evidence that harm reduction interventions, which include a range of specialized treatment services offering prescription and nonprescription programs as well as needle exchange, have been effective in reducing transmission of HIV among injection drug users.[11–13] Areas that introduced comprehensive harm reduction interventions for injection drug users a decade ago currently have either a low and stable HIV prevalence, as in Australia and the United Kingdom,[14–17] or a falling prevalence, as in Geneva, Switzerland.[18] Transmission of hepatitis B virus (HBV) has also declined in these areas.[17,18] There has, however, been little direct evidence indicating that these measures reduce transmission of HCV.[19,20]

We conducted a large national cross-sectional study to establish the prevalence of antibodies to HCV (anti-HCV) in current injection drug users.

Methods

Complementary voluntary unlinked–anonymous surveys of drug users who had injected in the previous 4 weeks were conducted at drug agencies (organizations, both public and private, that provide services such as treatment, needle exchange, and advice to drug users) and in the community. Those agreeing to participate provided an oral fluid specimen and completed a brief questionnaire.

As part of an HIV prevalence monitoring program, all injectors in contact with 47 representative drug agencies in England and Wales during 1998 were eligible for inclusion. The methodology has been described elsewhere.[17] Briefly, agency staff offered participation to all of their injecting clients during the year; those who had not injected in the previous 4 weeks were excluded from the present analysis.

A community survey of injection drug users not receiving specialized treatment for their drug use was conducted in 7 English cities between October 1997 and June 1998 as part of a study of injecting risk behavior.[21] Participants were eligible for the study if they had both injected and not received specialized treatment or had contact with a drug worker in the previous 4 weeks. Recruitment and interviews occurred in a variety of sites, including street locations, social venues, and participants' homes.

Comparable data collected included age, sex, age at first injection, previous voluntary confidential HIV test history, area of recruitment, frequency of sharing injecting equipment ("During the last 4 weeks, how often have you shared injecting equipment?"), and number of sharing partners. The Injecting Risk Questionnaire[22] was used in collecting sharing data.

Oral fluid specimens were obtained with the EpiScreen device (Epitope, Inc, Beaverton, Ore) and tested for antibodies to HIV (anti-

Vivian D. Hope, Theresa Lamagni, and O. Noël Gill are with the Communicable Disease Surveillance Centre, Public Health Laboratory Service, London, England. Ali Judd, Matthew Hickman, and Gerry V. Stimson are with the Centre for Research on Drugs and Health Behaviour, Department of Social Science and Medicine, Imperial College School of Medicine, London. At the time of the study, Gillian Hunter was with the Criminal Policy Research Unit, Southbank University, London. Steve Jones is an independent consultant in Bristol, England. Linda Donovan and John V. Parry are with the Virus Reference Division, Public Health Laboratory Service, London.

Requests for reprints should be sent to Vivian D. Hope, PhD, MMedSc, Public Health Laboratory Service, Communicable Disease Surveillance Centre, 61 Colindale Ave, London NW9 5EQ, United Kingdom (e-mail: vhope@phls.org.uk).

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HIV), to HBV core antigen (anti-HBc), and to HCV. Details on laboratory methods have been published elsewhere[23]; specimens that were reactive on initial testing were subjected to confirmatory testing via alternative methods.

Associations between antibody prevalence and covariates were explored in univariate analyses and, subsequently, in a multivariable logistic regression model. In this model, significance was assessed with the likelihood ratio statistic; Stata 6.0 (Stata Corp, College Station, Tex) was used in these analyses.

Incidence rates were estimated among those who had been injecting for less than 2 years. Among those who had been injecting for up to 1 year, the average injecting career was assumed to be 0.5 years; similarly, for those who had been injecting between 1 and 2 years, the average injecting career was assumed to be 1.5 years. Those who were anti-HCV positive were assumed to have been infected at 0.25 and 0.75 years of injecting, respectively.

Results

A total of 2961 participants provided oral fluid samples and completed questionnaires. Of these individuals, 2203 were recruited through drug agencies, and 758 were recruited in the community.

The agency- and community-recruited participants had similar distributions of age and years injecting (Table 1). Overall, 29% were younger than 25 years, and 46% had injected for less than 6 years. Agency-recruited injectors were less likely to be female or to have been recruited in London (Table 1). Similar proportions in the agency and community groups reported sharing injecting equipment in the previous month and having had a voluntary confidential HIV test (Table 1).

The prevalence of anti-HCV was 30% (895/2943), and the prevalence of anti-HBc was 21% (616/2955). Table 2 shows the prevalence of anti-HCV and anti-HBc by different risk factors. Further analysis of risk factors for HIV infection was precluded by the low prevalence of anti-HIV (less than 1%).

TABLE 1—Characteristics of Agency- and Community-Recruited Injection Drug Users: England and Wales, 1997–1998

	Agency-Recruited, No. (%) (n = 2203)	Community-Recruited, No. (%) (n = 758)	χ^2	*P*
Age, y				
<25	633 (29)	232 (31)		
25–29	558 (25)	194 (26)		
30–34	503 (23)	160 (21)		
≥35	509 (23)	171 (23)		
Total	2203	757	1.5	.679
Gender				
Female	476 (22)	220 (29)		
Male	1716 (78)	535 (71)		
Total	2192	755	17.2	<.001
Number of years injecting				
0–2	557 (26)	198 (27)		
3–5	444 (21)	131 (18)		
6–8	293 (14)	109 (15)		
9–11	224 (10)	82 (11)		
12–14	204 (10)	72 (10)		
≥15	423 (20)	145 (20)		
Total	2145	737	3.3	.653
Shared injecting equipment in previous month				
No	1148 (58)	426 (56)		
Yes	833 (42)	328 (44)		
Total	1981	754	0.5	.492
Previous voluntary confidential HIV test				
No	1016 (48)	361 (48)		
Yes	1092 (52)	395 (52)		
Total	2108	756	0.0	.833
Area of recruitment				
London	356 (16)	244 (32)		
Elsewhere	1847 (84)	514 (68)		
Total	2203	758	89.7	<.001

Note. Complete behavioral and demographic information was not provided by some participants.

Anti-HCV prevalence increased from 7% among those injecting for less than 3 years to 62% for those who had been injecting for 15 years or more. In comparison with those who had injected for less than 3 years, the adjusted odds ratios of having anti-HCV were just over 3 for those who had injected for 6 to 8 years and above 7 for those who had injected for 15 or more years ($\chi^2_5 = 120.8$, $P < .001$; Table 2).

The association between age and anti-HCV prevalence was weaker but still statistically significant, with an odds ratio above 2 for anti-HCV in those 30 years or older relative to those younger than 20 years ($\chi^2_6 = 15.6$, $P < .02$). Anti-HCV prevalence was elevated in participants who had undergone a previous voluntary confidential HIV test, in those recruited in London, and in those recruited at drug agencies (Table 2).

Prevalence of anti-HBc increased from 5% in those injecting for less than 3 years to 52% in those injecting for 15 or more years. In comparison with those injecting for less than 3 years, the adjusted odds ratios for the presence of anti-HBc were 6.5 among those injecting for 15 or more years and above 2 among those injecting 6 to 8 years ($\chi^2_5 = 103.8$, $P < .001$; see Table 2). Anti-HBc prevalence increased with increasing age; the odds ratio for anti-HBc was above 2 in those 40 years and older in comparison with those younger than 20 years ($\chi^2_6 = 32.7$, $P < .001$). Having undergone a previous voluntary confidential HIV test was positively associated with anti-HBc, but area and site of recruitment were not.

Previous HBV infection was associated with HCV infection (Table 2); 59% (363/612) of those with anti-HBc also had anti-HCV, compared with only 23% of those without anti-HBc ($\chi^2_1 = 50.1$, $P < .001$). Frequency of sharing injecting equipment in the 4 weeks before participation (42%) was not associated with either anti-HCV or anti-HBc prevalence.

The annual incidence of HCV infection was estimated to be 4.6% in those who had injected for less than 2 years (23 infections in 502.8 years of exposure), among whom the anti-HCV prevalence was 4.9% (23/471). The equivalent annual incidence for HBV infection was 3.6%, with an anti-HBc prevalence in this group of 3.8%.

Discussion

At 30%, the prevalence of anti-HCV found in this study was much lower than that found in previous studies. Among those who had been injecting for less than 3 years, the prevalence was 7.4%, and the estimated annual incidence in those who had begun injecting in the previous 2 years was below 5%. These results differ from other evidence suggesting that

TABLE 2—Risk Factors for the Presence of Antibodies to HCV (anti-HCV) and HBc (anti-HBc) in Injection Drug Users (n = 2961): England and Wales, 1997–1998

	No. Anti-HCV Positive/ No. Tested[a]	Anti-HCV Positive, %	Odds Ratio		No. Anti-HBc Positive/ No. Tested[a]	Anti-HBc Positive, %	Odds Ratio	
			Unadjusted	Adjusted[b] (95% CI)			Unadjusted	Adjusted[c] (95% CI)
Years injecting								
0–2	56/754	7	1.0	1.0	39/752	5	1.0	1.0
3–5	106/572	19	2.8	2.4 (1.7, 3.4)	54/573	9	1.9	1.5 (0.9, 2.3)
6–8	112/400	28	4.8	3.3 (2.2, 4.8)	61/402	15	3.3	2.2 (1.4, 3.4)
9–11	113/303	37	7.4	4.5 (3.0, 6.7)	52/306	17	3.7	1.9 (1.1, 3.1)
12–14	142/274	52	13.4	6.0 (4.0, 9.1)	100/276	36	10.4	4.7 (2.9, 7.6)
≥15	345/561	62	19.9	7.1 (4.7, 10.6)	292/567	52	19.4	6.5 (4.1, 10.3)
Age, y								
<20	14/244	6	1.0	1.0	12/243	5	1.0	1.0
20–24	77/619	12	2.3	1.4 (0.7, 2.5)	37/617	6	1.2	0.9 (0.4, 1.9)
25–29	187/746	25	5.5	1.9 (1.0, 3.4)	96/752	13	2.8	1.3 (0.6, 2.6)
30–34	279/659	42	12.1	2.3 (1.3, 4.3)	187/663	28	7.6	1.8 (0.9, 3.5)
35–39	160/357	45	13.3	2.2 (1.2, 4.2)	122/358	34	10.0	1.8 (0.9, 3.8)
40–44	106/189	56	21.0	2.5 (1.3, 5.0)	87/192	45	16.0	2.5 (1.2, 5.4)
≥45	72/128	56	21.1	2.7 (1.3, 5.6)	75/129	58	31.5	4.5 (2.0, 10.2)
Sex								
Female	176/686	26	1.0	1.0	133/693	19	1.0	1.0
Male	717/2243	32	1.4	1.1 (0.8, 1.3)	482/2248	21	1.0	0.9 (0.7, 1.2)
Previous confidential HIV test								
No	249/1372	18	1.0	1.0	174/1374	13	1.0	1.0
Yes	614/1475	42	3.2	1.8 (1.5, 2.2)	422/1484	28	2.7	1.5 (1.2, 1.8)
Area								
Outside London	647/2361	27	1.0	1.0	431/2356	18	1.0	1.0
London	248/582	43	2.0	1.3 (1.0, 1.6)	185/599	31	2.0	1.1 (0.9, 1.4)
Recruitment site								
Community	170/740	23	1.0	1.0	150/753	20	1.0	1.0
Agency	725/2203	33	1.6	1.9 (1.5, 2.4)	466/2202	21	1.1	1.0 (0.8, 1.3)
Anti-HIV result								
Negative	878/2910	30	1.0	1.0	600/2927	21	1.0	1.0
Positive	17/28	61	3.6	1.5 (0.6, 3.5)	16/28	57	5.2	1.5 (0.6, 3.6)
Anti-HBc result								
Negative	531/2325	23	1.0	1.0	249/2043	12	1.0	1.0
Positive	363/612	59	4.9	2.3 (1.8, 2.8)	363/894	41	4.9	2.3 (1.8, 2.9)

Note. CI = confidence interval; HCV = hepatitis C virus; HBc = hepatitis B virus core antigen.
[a]Not all samples were of sufficient volume to test for antibodies to all 3 viruses, and complete behavioral and demographic information was not provided by some participants.
[b]Adjusted for years injecting, age, previous HIV test, area, recruitment site, and anti-HBc result.
[c]Adjusted for years injecting, age, previous HIV test, and anti-HCV result.

HCV infection in injection drug users is difficult to prevent and that infection is acquired rapidly after initiation into injecting.[9–10]

The reliability of the oral fluid tests used is important in assessing our study's results. Ongoing assessment suggests sensitivity and specificity rates of 80% and 99%, respectively, for anti-HCV and 82% and 99%, respectively, for anti-HBc.[23] An evaluation of a similar technique in Scotland showed that anti-HCV was present in the oral fluid of 85% of 115 injection drug users with serum antibodies to HCV.[24] Adjusting for a test sensitivity of 80% would increase the overall anti-HCV prevalence to 38% and result in an estimated incidence among recent initiates of 5.7%, but these figures are still lower than what would be expected on the basis of previous studies. Such an adjustment for low test sensitivity would leave unchanged the relative differences in anti-HCV prevalence according to duration of injection and age.

The illegality of injection drug use, its rarity in the population overall, and the marginalization of injection drug users combine to make monitoring of blood-borne virus transmission in this group difficult. Although injectors can be recruited and followed up while receiving treatment,[25] such interventions are completed by only a subset of participants who tend to be older and to have longer injection drug use careers, which in turn may make their infection incidence rates unrepresentative. The most useful and "representative" data from which inferences about transmission trends can be drawn are probably those provided by large voluntary, unlinked–anonymous cross-sectional surveys of injectors recruited concurrently from drug services and community sites, as we have described here.

Two other studies provide further evidence of a low anti-HCV prevalence among injectors in England and Wales. First, a 1997–1998 survey of prison inmates reported an anti-HCV prevalence of 30% among more than 800 prisoners who reported ever injecting drugs.[26] Second, an unlinked–anonymous survey involving syphilis serology specimens from more than 1300 injection drug users attending genitourinary medicine clinics during 1995–1996 revealed an anti-HCV prevalence rate of 37% (K. Balogun, written communication, August 1999). Once adjusted for test sensitivity, the results of the oral fluid surveys were the same as in this serum survey.

Moreover, the anti-HIV and anti-HBc prevalence in our survey was consistent with earlier data from surveys of injectors recruited in drug service and community settings.[15–17] Previous studies in England and Wales may

have led to overestimation of the overall prevalence of anti-HCV because they recruited individuals receiving diagnostic tests while attending drug treatment agencies, and these respondents tended to be older and to have had long injecting careers.

Our findings suggest that the prevalence of HCV infection among injection drug users in England and Wales is lower than that in other industrialized countries.[1] They also suggest that transmission of HCV among injection drug users in England and Wales may have been reduced in recent years. We may be observing an "aging cohort" effect in the age-specific prevalence of anti-HCV similar to that observed for anti-HBc following the large decrease in hepatitis B transmission in the mid-1980s.[27] The possibility of a similar decline in HCV transmission among injection drug users in Geneva, Switzerland[18]; Victoria, Australia[28]; and Scotland[29]—albeit against a background prevalence in excess of 50%—has been suggested.

Cross-sectional surveys such as ours, however, cannot provide proof that prevalence and estimated incidence have decreased, establish when such a decrease occurred, or monitor whether the decline is continuing. It is essential, therefore, that prevalence and incidence of anti-HCV in injectors with short injecting careers be monitored for a number of years.

Cohort studies of the effects on HCV incidence of individual harm reduction activities, such as needle exchange programs, have produced inconclusive findings,[30–32] but these evaluations of individual prevention measures would not have revealed possible synergistic benefits from large-scale programs consisting of a variety of harm reduction activities. In the United Kingdom, an extensive program that includes widespread access to drug treatment services has existed for many years. An estimated 25 million syringes were distributed in the United Kingdom in 1997, a total that may be higher than that for the United States (J. Parsons, verbal communication, August 1999).

The public health success in England and Wales with regard to controlling HIV in injection drug users may have engendered complacency, and opportunities to control HCV transmission through intensifying harm reduction possibly are being missed. Evidence from HIV research[12] suggests that increased investment in comprehensive provision of harm reduction interventions may be rewarded with a decrease in HCV transmission. □

Contributors

V.D. Hope, T. Lamagni, and O.N. Gill were responsible for the survey of injection drug users attending agencies. The community survey was undertaken by A. Judd, M. Hickman, G. Hunter, G.V. Stimson, and S. Jones. Collaboration between the Public Health Laboratory Service and the Centre for Research on Drugs and Health Behaviour was established and coordinated by M. Hickman. The development and application of laboratory methods was undertaken by L. Donovan and overseen by J.V. Parry. Analysis was undertaken by A. Judd, assisted by V.D. Hope. All authors contributed to the writing of the paper.

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